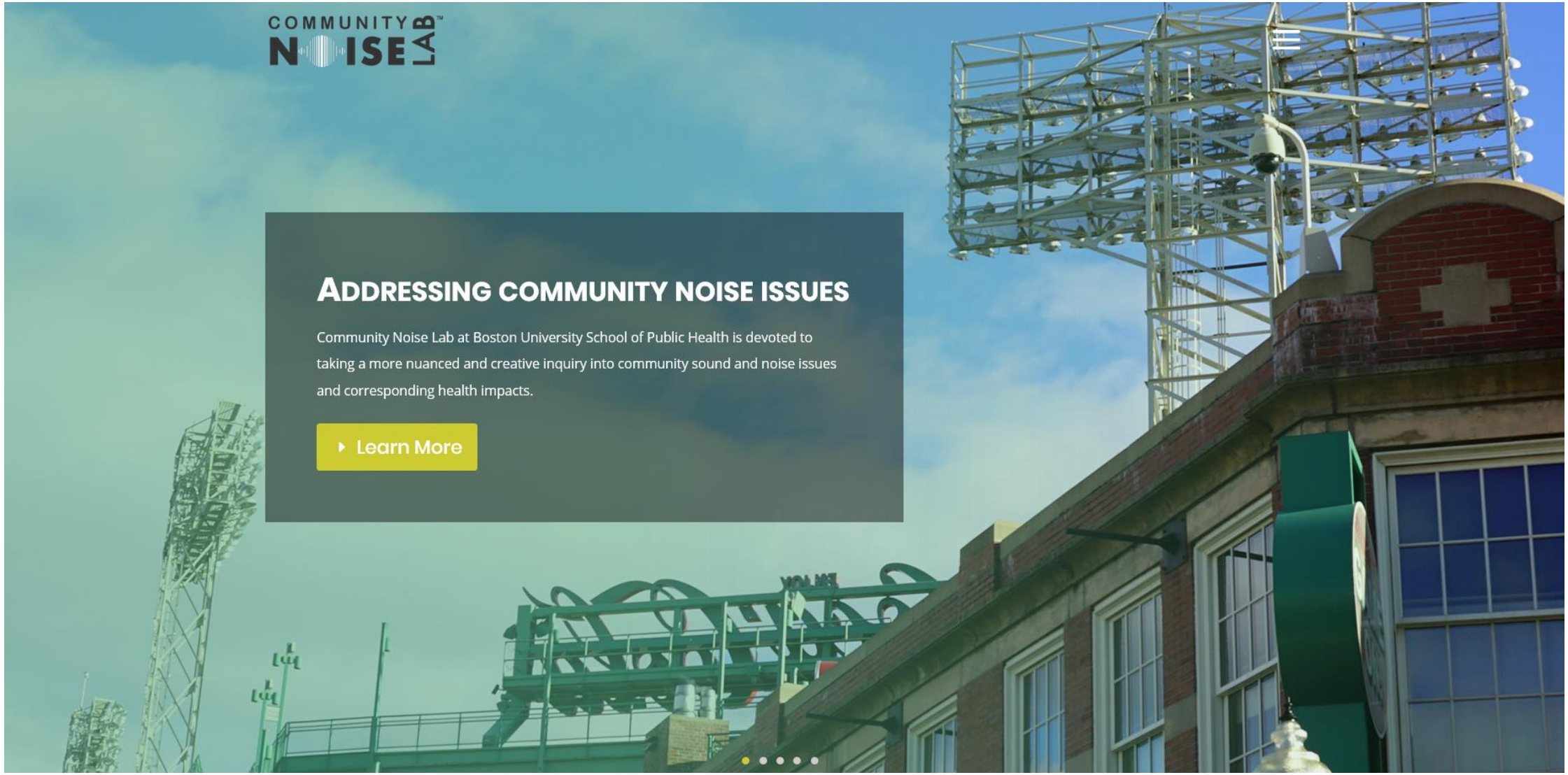
COMMUNITY NOISE LAB™

Erica Walker, MSc, ScD

unite. evaluate. take actions.


COMMUNITY NOISE LAB
ADDRESSING COMMUNITY NOISE ISSUES
Community Noise Lab at Boston University School of Public Health is devoted to taking a more nuanced and creative inquiry into community sound and noise issues and corresponding health impacts.
Learn More

Real-time Sound Monitoring

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NoiseScore App and Community Noise Metric

Research Collaborators

- Software & Application Innovation Lab (SAIL)
- BU Department of Mathematics and Statistics Master of Science in Statistical Practice

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Community Noise Survey

- Administered to gather a better understanding of residents' attitudes and response to community noise.
- 33 questions, takes < 10 minutes to complete
- Available in Spanish and English
- Will correlate with real-time data collection

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Lab-Based Experiments

- How does exposure to urban environmental sound impact our brain activity?
- How are these responses modified by self-reported noise perception?
- How are these responses modified by hearing loss?
- What is the relationship between hearing loss and noise perception?

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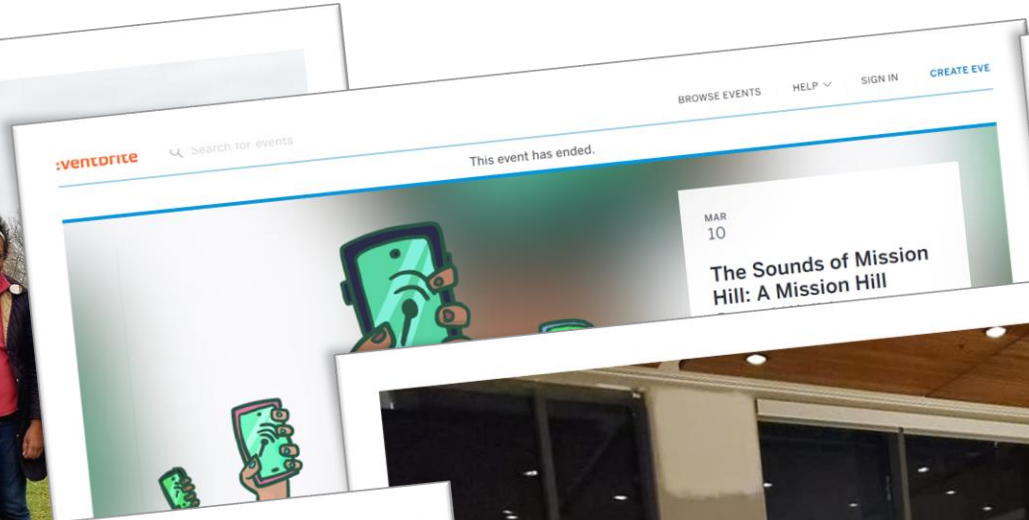
Community Engagement Events



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Our Research Agenda

- A **<u>community sound exposure assessment</u>** MUST have the following elements to be effective and impactful:
  - Metrics to measure a sound's **<u>loudness</u>**
  - Metrics to measure a sound's **<u>character</u>**
  - Metrics to measure **<u>noise perception</u>**
  - Metrics to describe and identify **vulnerable and at risk populations**
  - **Community inclusion**
    - **Thank you, Councilwoman Mejia and Jerome Smith!**

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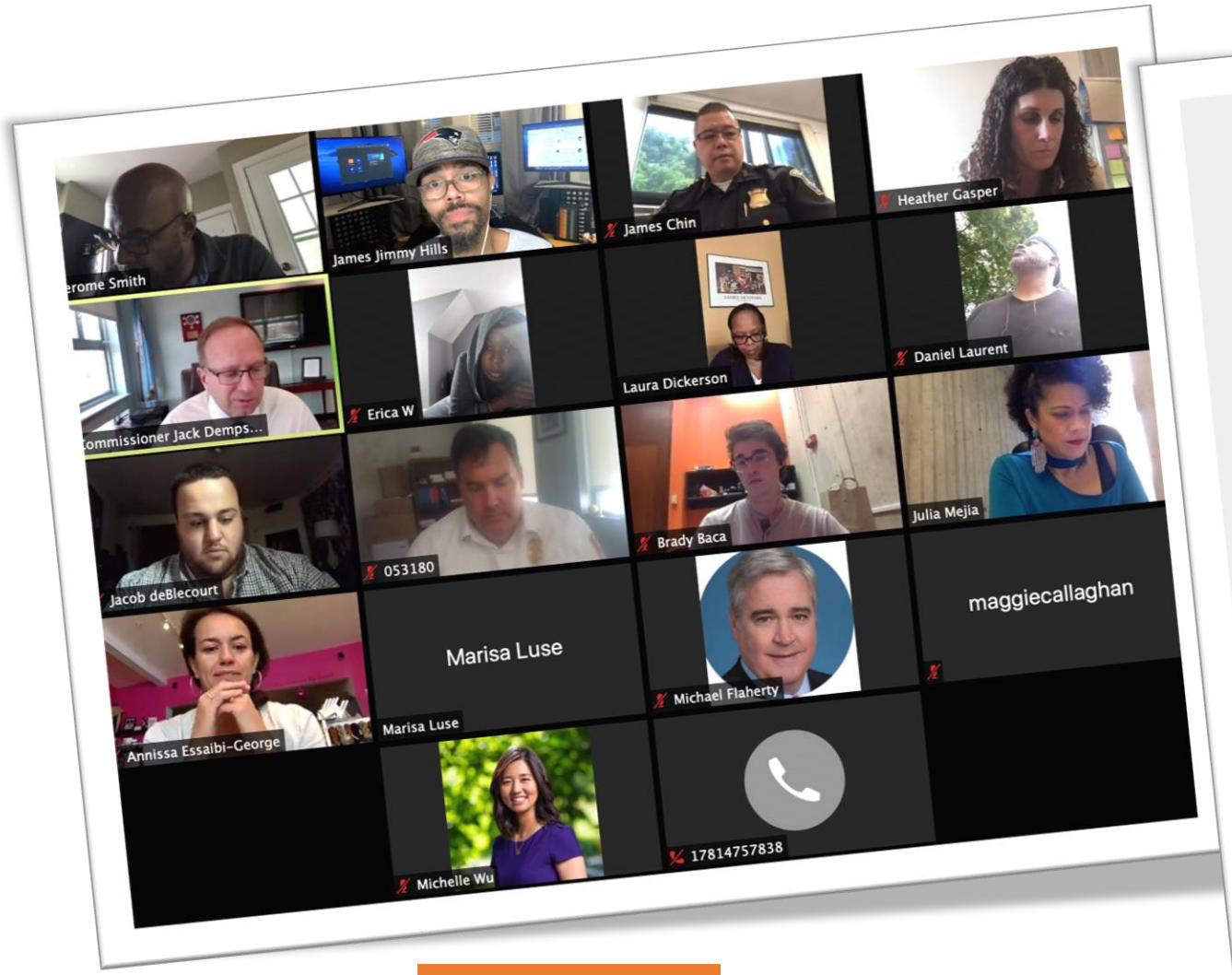
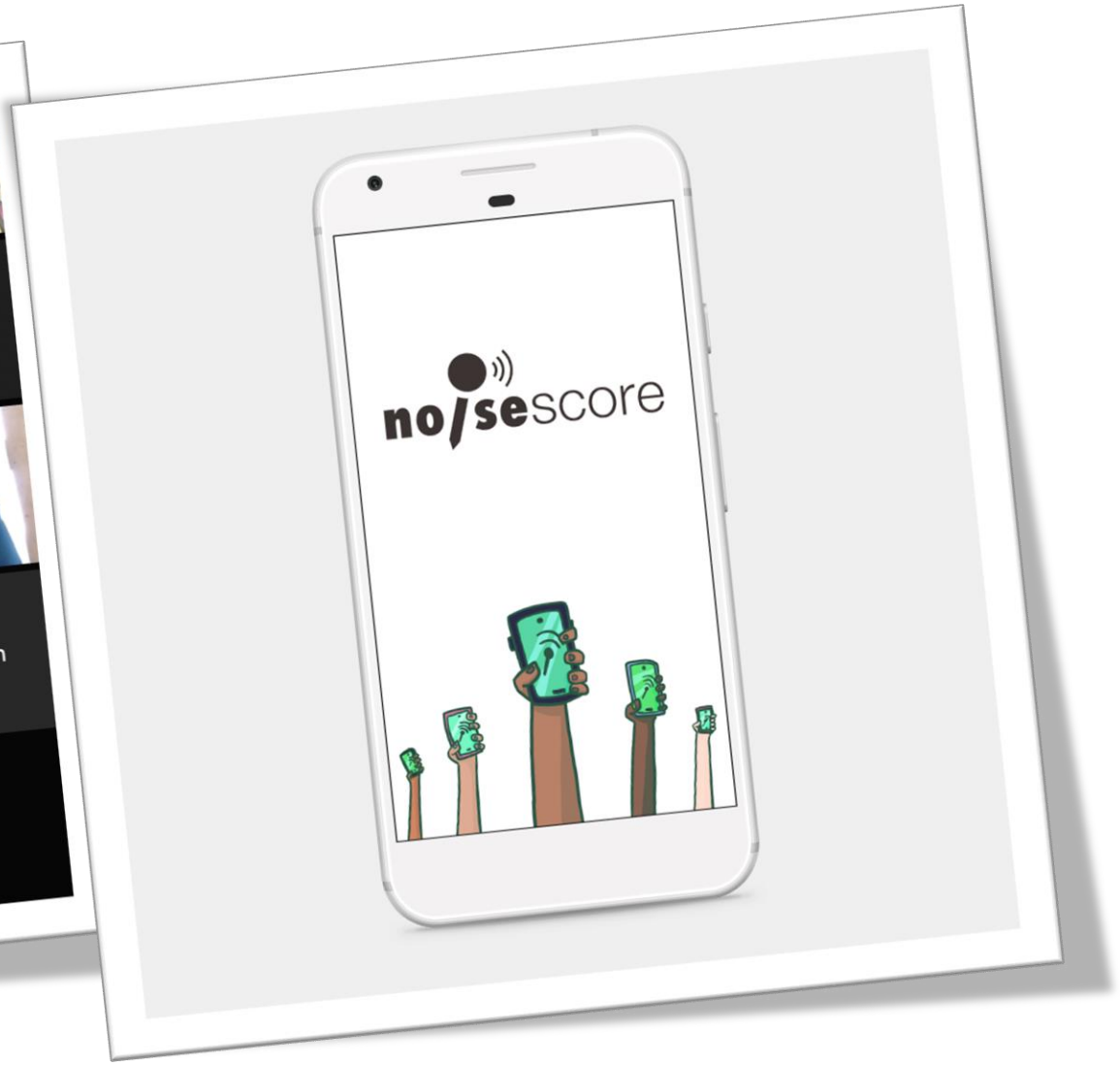
Community Inclusion





YOU!

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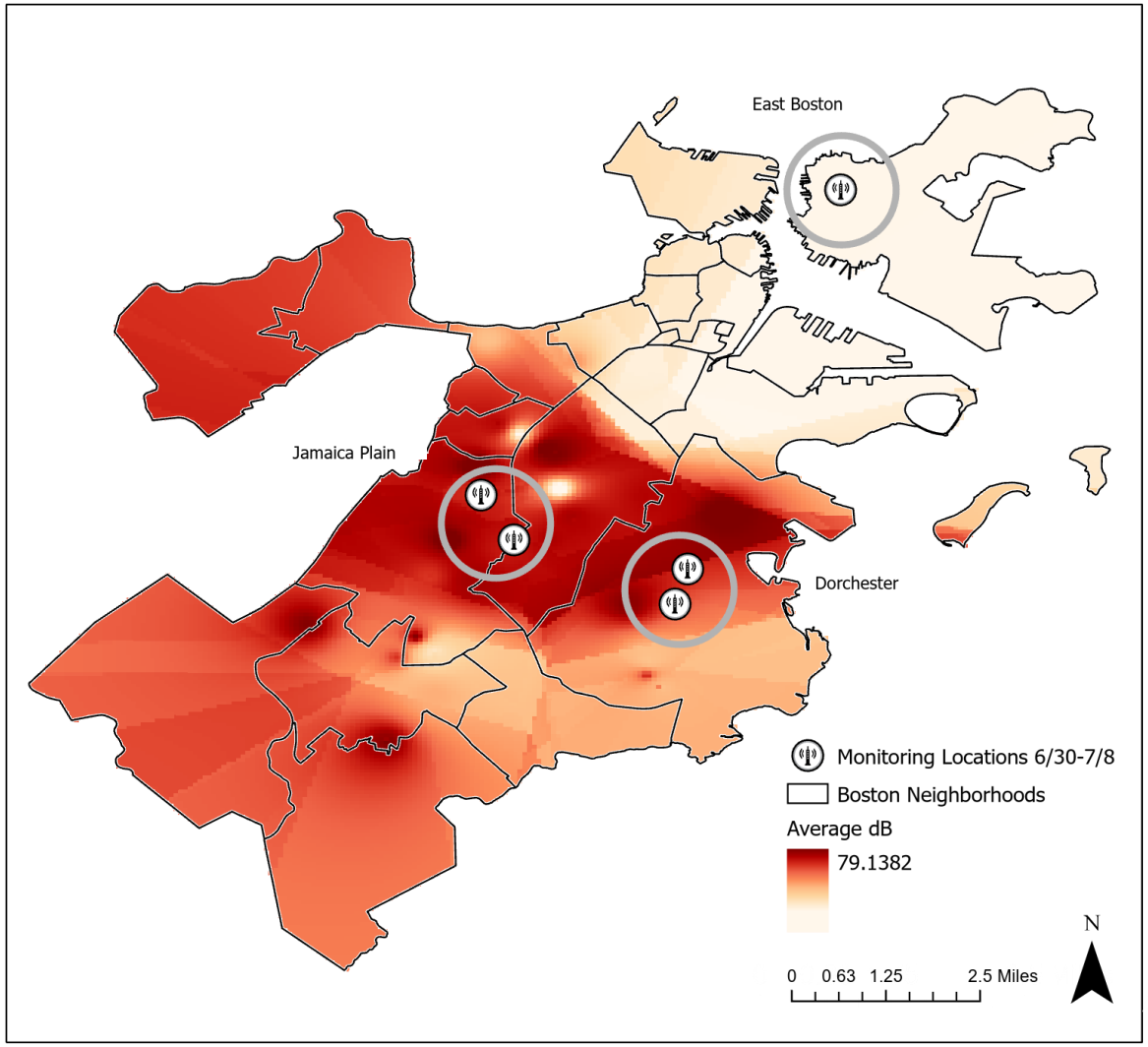
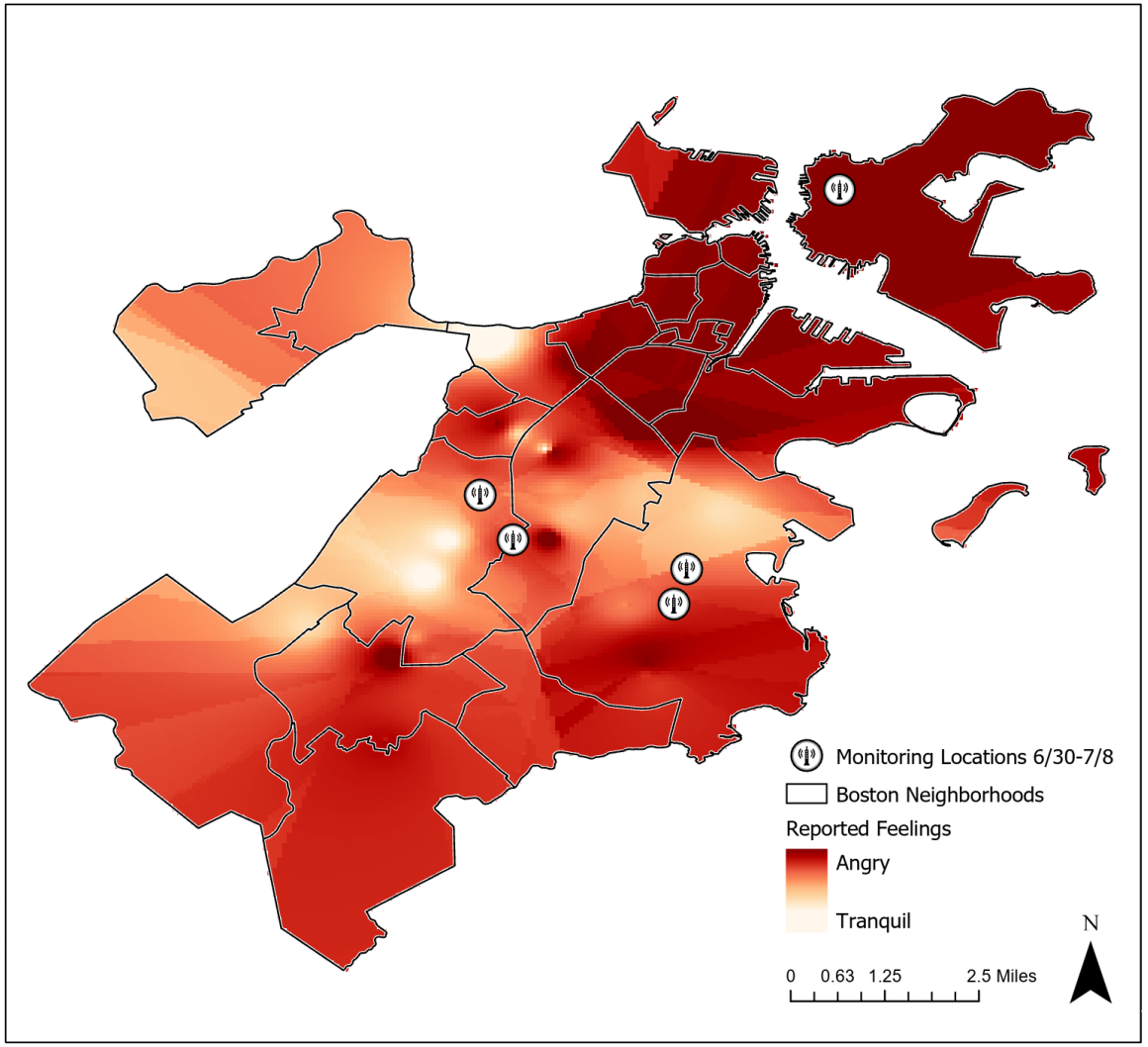
NoiseScore App Data



Measured Sound Levels



Reported Feelings

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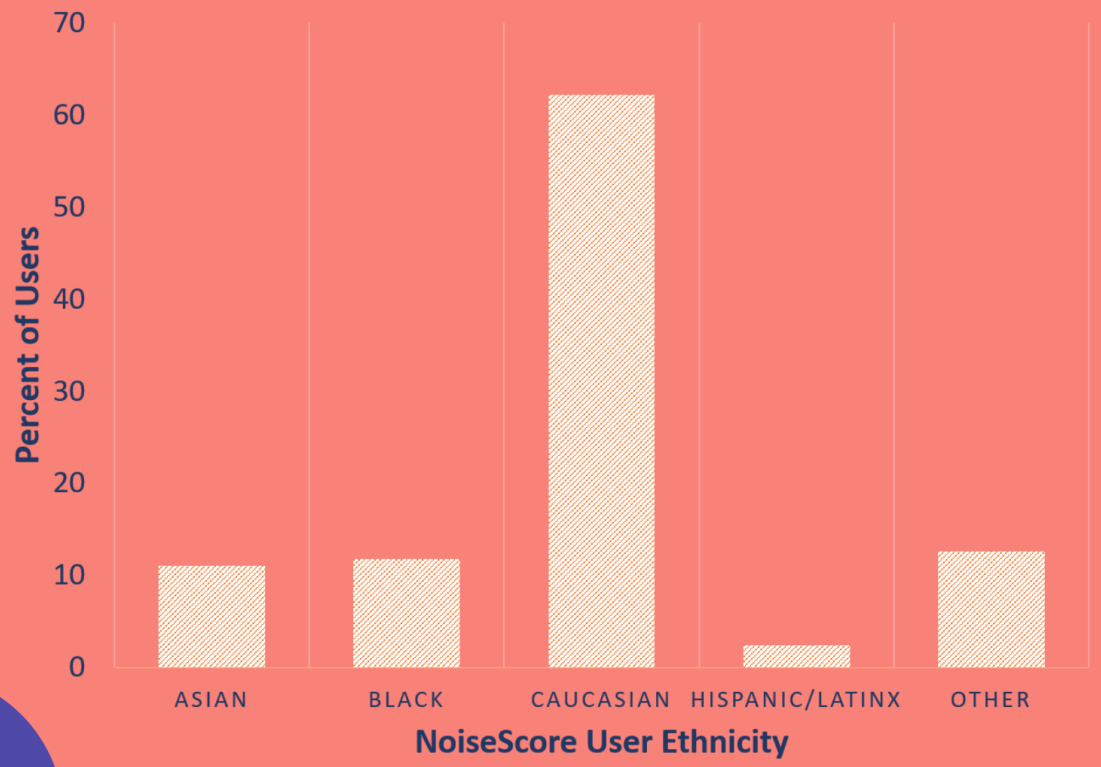
Who's Using NoiseScore?



"Citizen" or Democratic Science is only as powerful as it is representative. Using NoiseScore, Boston residents have logged hundreds of sounds and have recorded how these sounds make them feel. We need to hear from our BIPOC residents. We need to make sure that your voice is heard and reflected in our analysis.

Grab your phone and download NoiseScore today!

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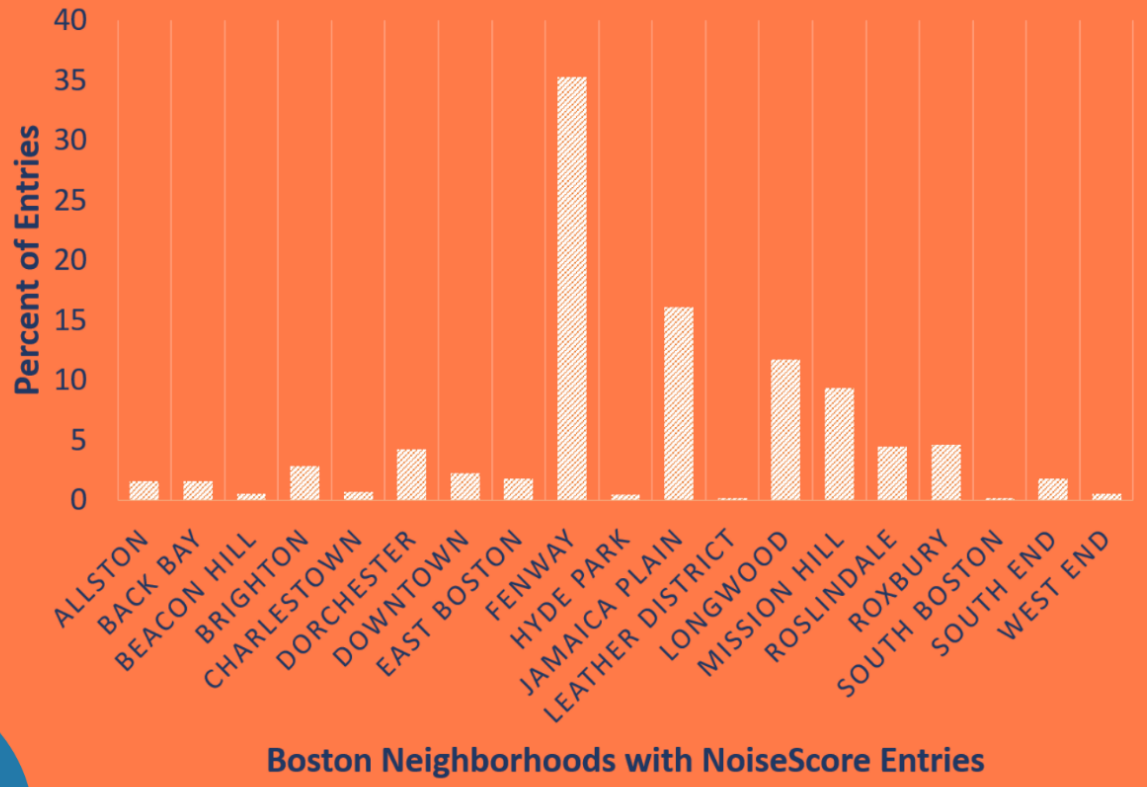
Who's Using NoiseScore?



Using the Community Noise Lab's NoiseScore App, Boston residents have logged hundreds of sounds and have recorded how these sounds make them feel. However, without a good distribution across Boston, we can't fully address the impact urban sounds have on health in our community.

Grab your phone and download NoiseScore today!

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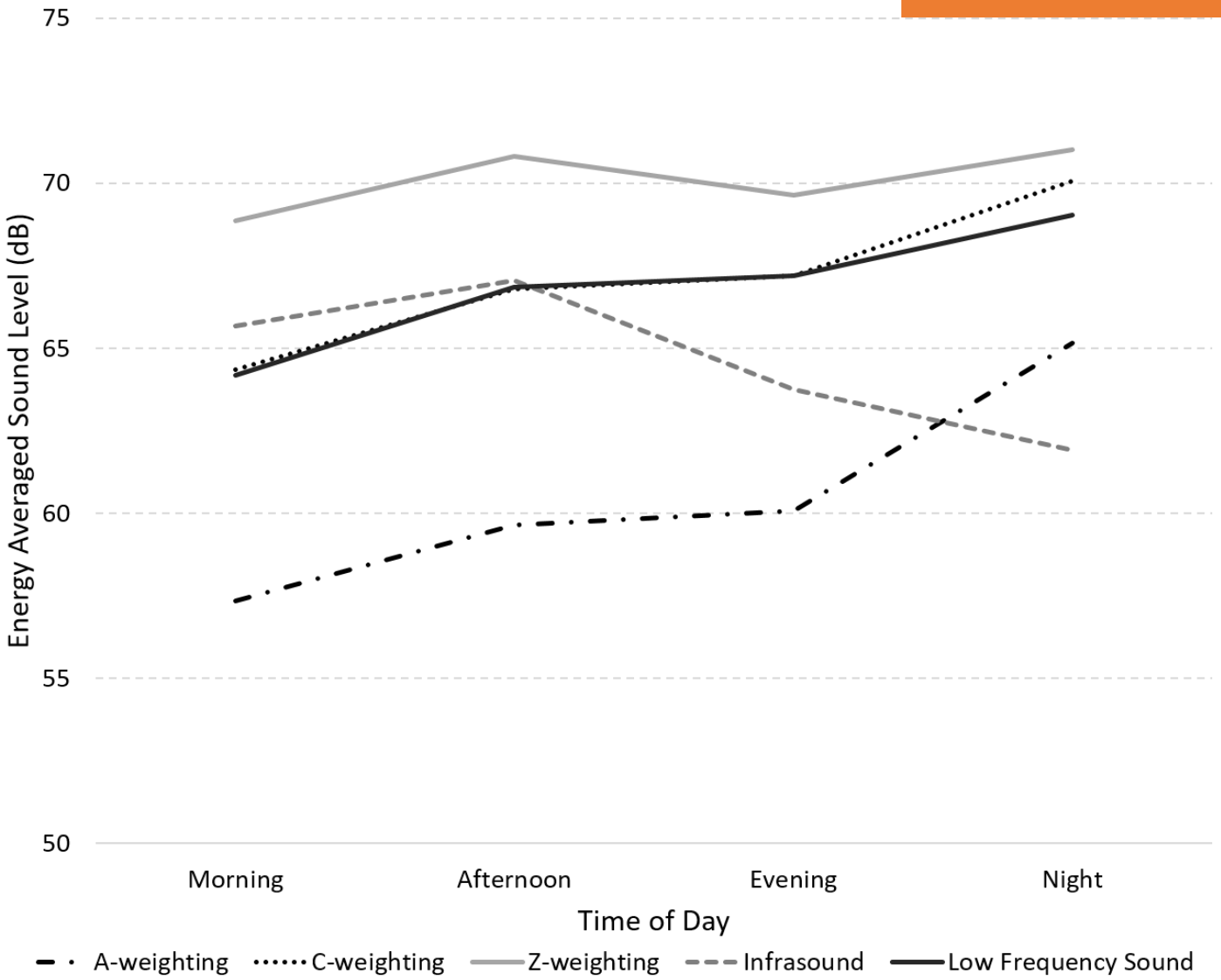
Sound Level Data: TIME OF DAY



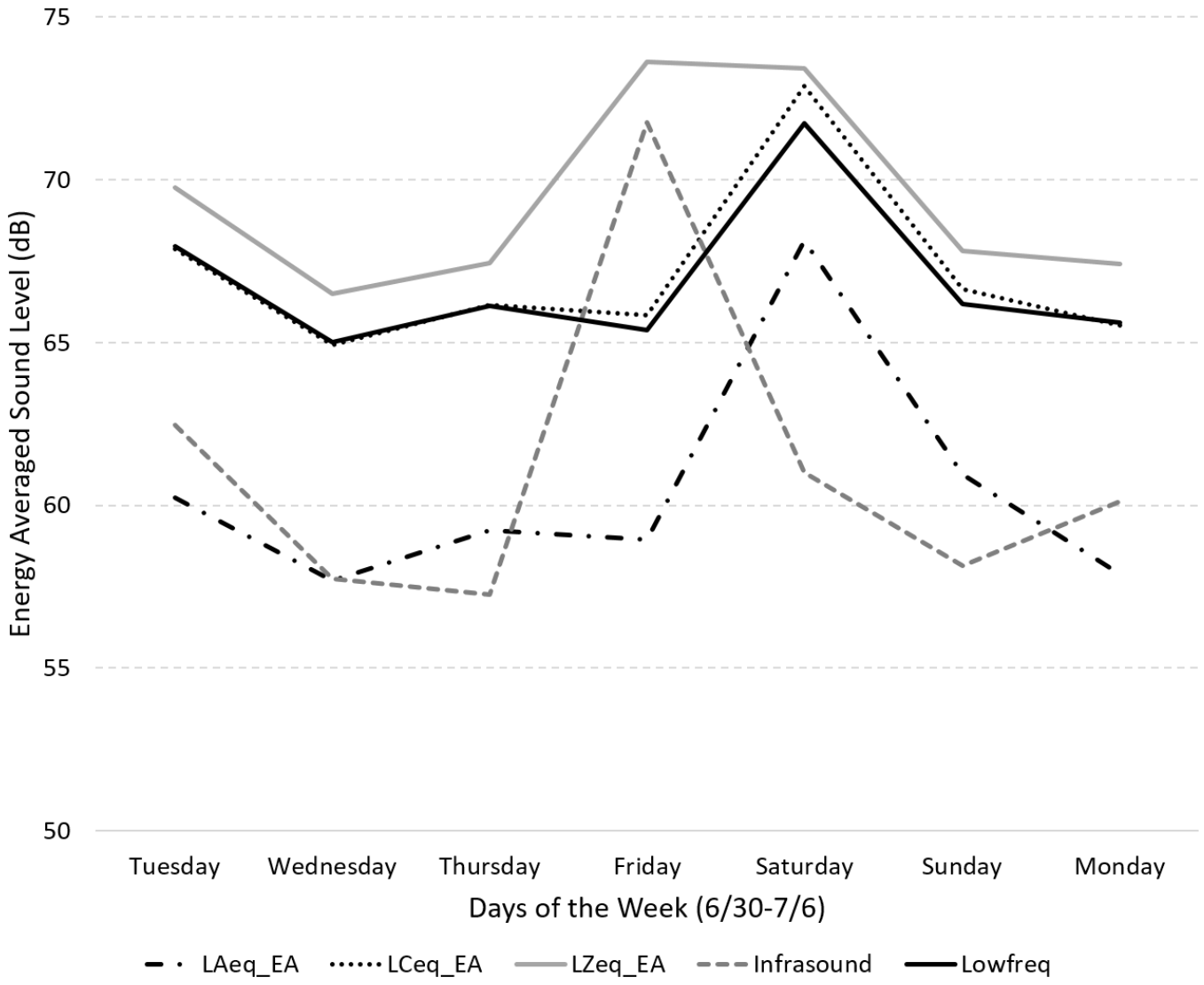
Key Findings

1. Overall, average sound levels were highest at night (65 dBA) and lowest in the morning (57 dBA).

2. JP sites had the highest sound levels.

3. East Boston and Dorchester were almost identical.

Sound Level Data: Day OF WEEK

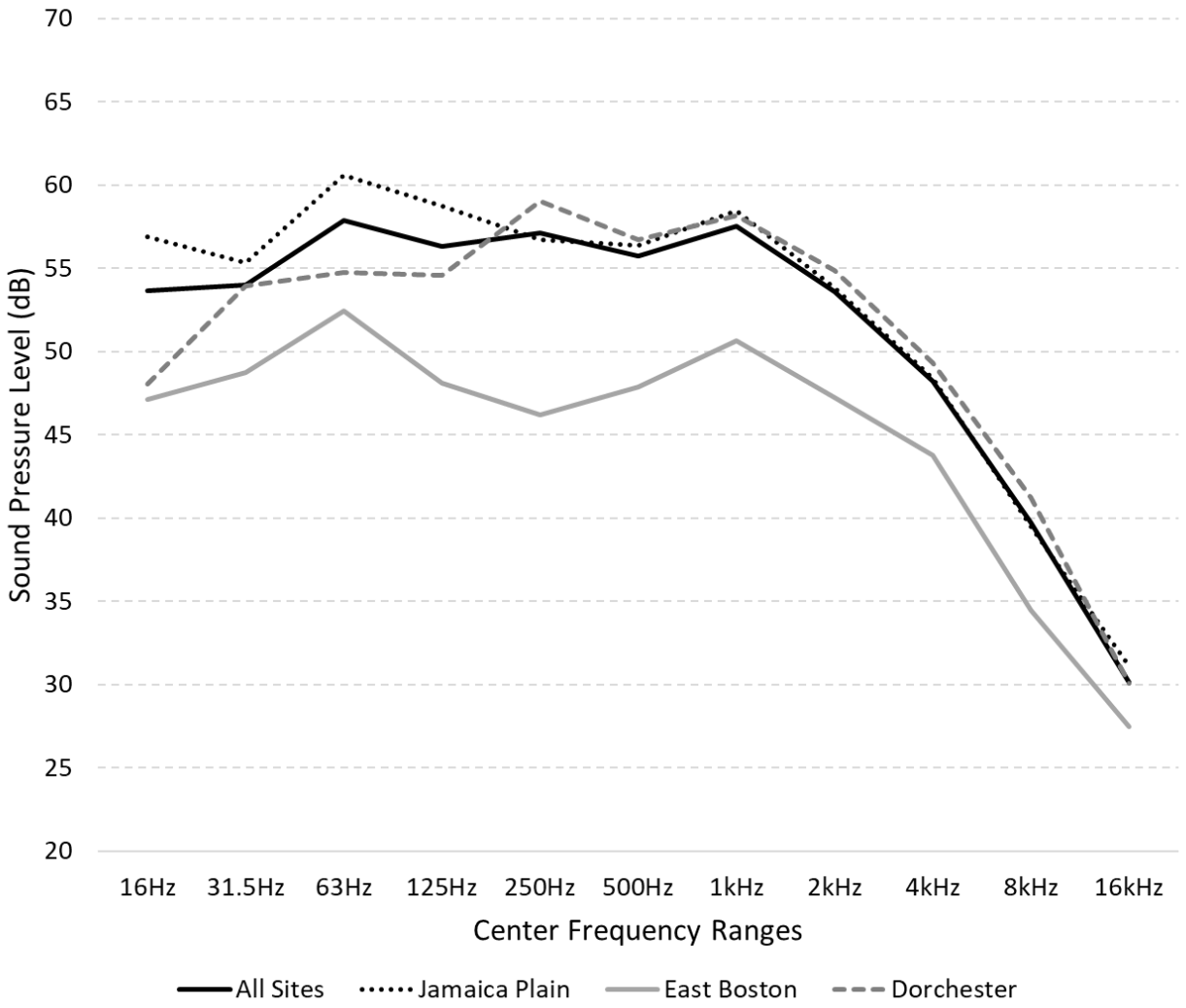


Key Findings

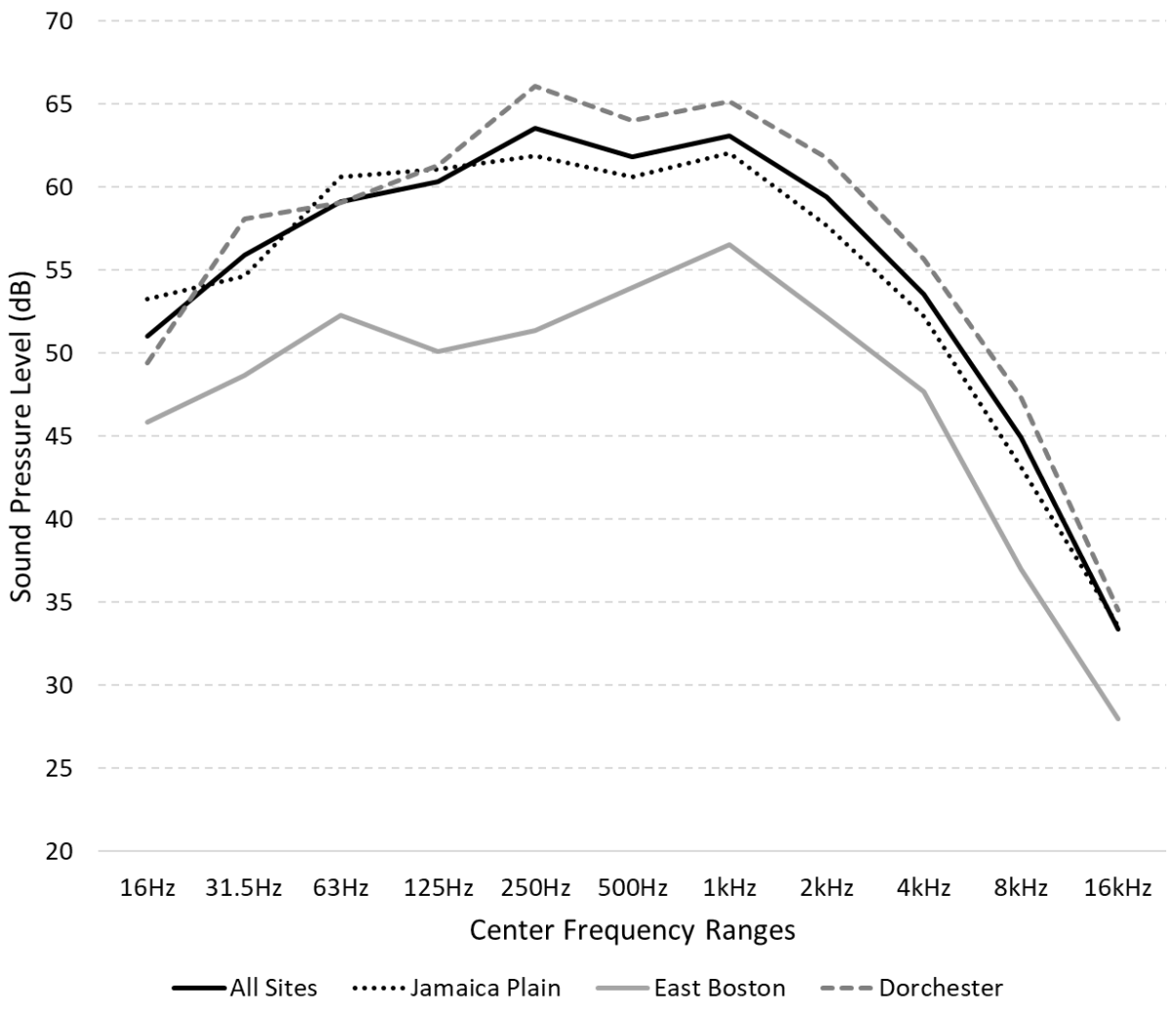
1. Friday and Saturday were the loudest, with July 4th being the loudest (63 dBA)
2. JP sites had the highest sound levels.
3. East Boston and Dorchester were almost identical.

	Health Effect	Decibel Level dB(A)	Cause for Concern?
Anxiety and Mood Disruption	Anxiety	Increased risk per 5dB increase over 51 dB	**YES**
	Disturbance related physiological reactions (vegetative hormonal secretions, cortical arousals and body movements)	33 dB	**YES**
Sleep disruption	Increased risk of sleep disturbances (difficulty falling asleep, awakenings, waking up too early)	Increased risk per 5 dB increase over 45 dB	**YES**
	Sleep medication use	Increased risk per 5 dB increase over 45 dB	**YES**
Cardiovascular Disorders	Prevalent hypertension and systolic blood pressure	56.7 (nighttime levels)	**YES**
	Elevated risk for heart failure	> 65 dB	**YES (when considering LDN)**
	Strokes among the elderly	Increased risk per 10 dB higher level of road traffic noise over 60 dB	**YES (when considering LDN)**
Non Cardiovascular Disorders	Diabetes	Increased risk per 10 dB for 5-year exposure over 20 dB	**YES**
	Recall memory in children	>62 dB	**YES (when considering LDN)**

Sound Level Data: Character



Rest of Week



July 4th

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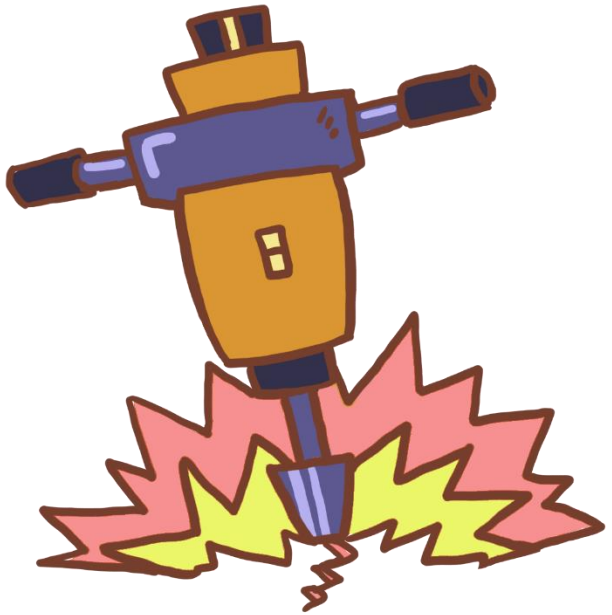
Sound Level Data: Character

		All days					July 4th				
		Energy Average	Mean	P10	Median	P90	Energy Average	Mean	P10	Median	P90
All Comparable Sites	16Hz	54	49	42	49	55	51	49	43	49	55
	31.5Hz	54	50	43	51	58	56	50	43	50	58
	63Hz	58	54	47	53	62	59	54	46	54	64
	125Hz	56	50	41	49	60	60	51	40	49	65
	250Hz	57	47	38	46	56	64	49	37	48	66
	500 Hz	56	46	35	44	57	62	48	34	46	65
	1000 Hz	58	49	39	47	59	63	51	37	49	67
	2000 Hz	54	45	36	45	54	59	48	35	46	64
	4000 Hz	48	42	32	42	50	54	44	34	43	57
	8000 Hz	40	32	23	32	41	45	35	25	33	47
	16000 Hz	30	27	24	26	32	33	28	24	26	35

Conclusion: Firework sounds are dominated by low frequency ranges

Unreasonable Sound Levels



According to the City of Boston, unreasonable sound levels are anything louder than **50 dBA** from 11 p.m. to 7 a.m., or anything louder than **70 dBA** at any time.

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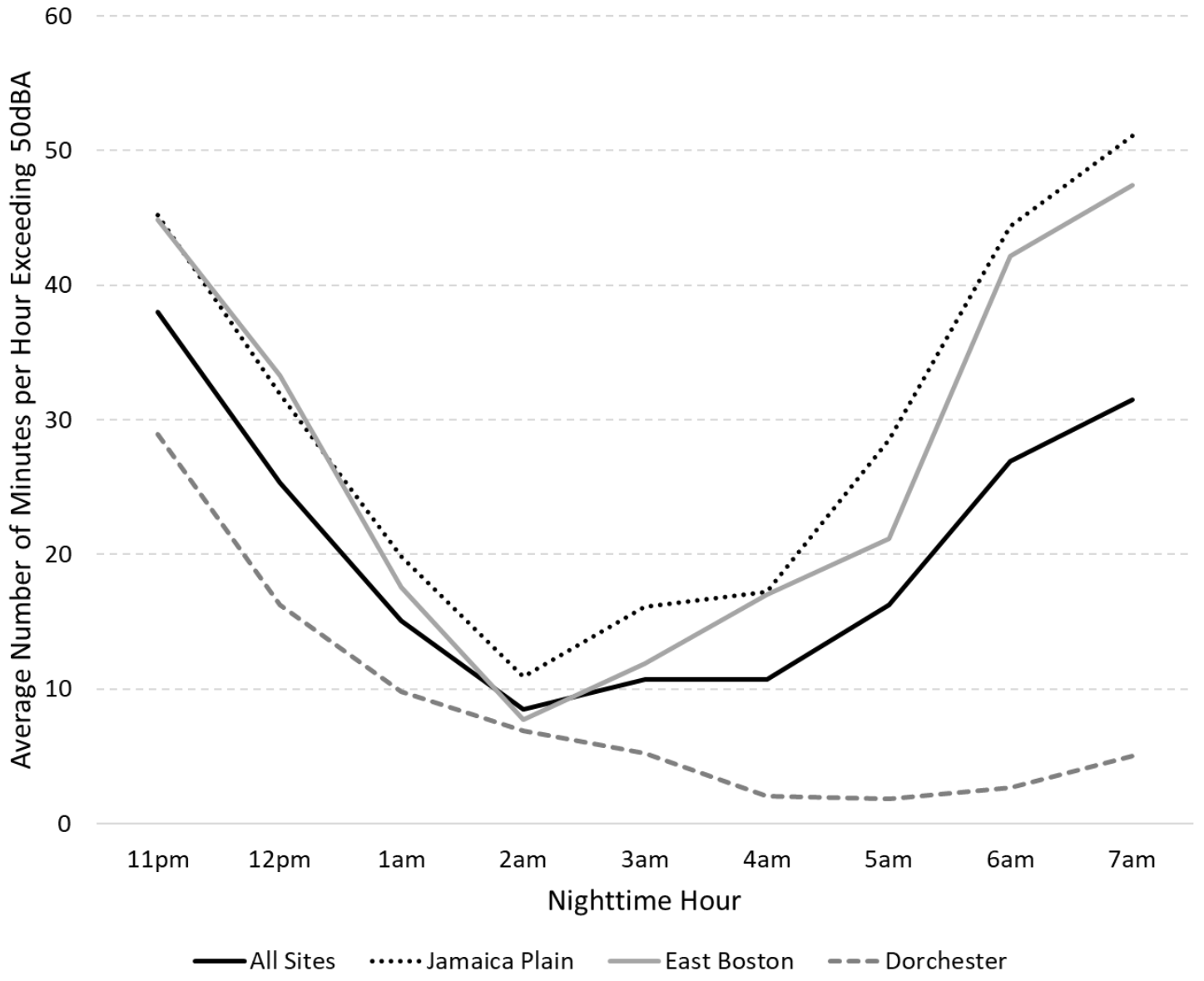
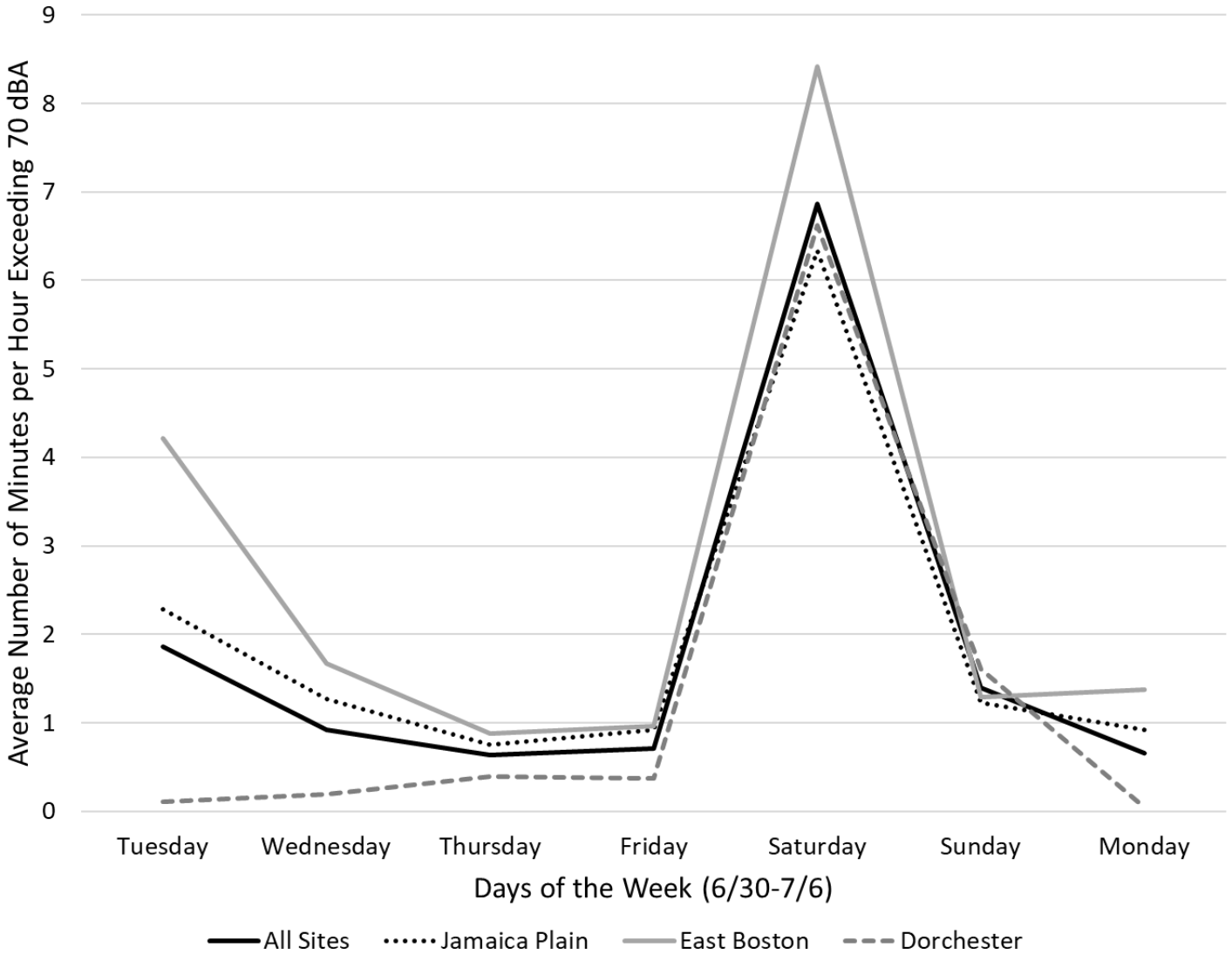
Noise Ordinance Violations Between 11 pm and 7 am



Noise Ordinance Violations



Key Findings

1. From 11 pm – 7 am, on average, approximately 40 minutes of each hour exceeds noise ordinance guidelines.

2. On July 4th, approximately 8 minutes every hour exceeded 70 dBA.

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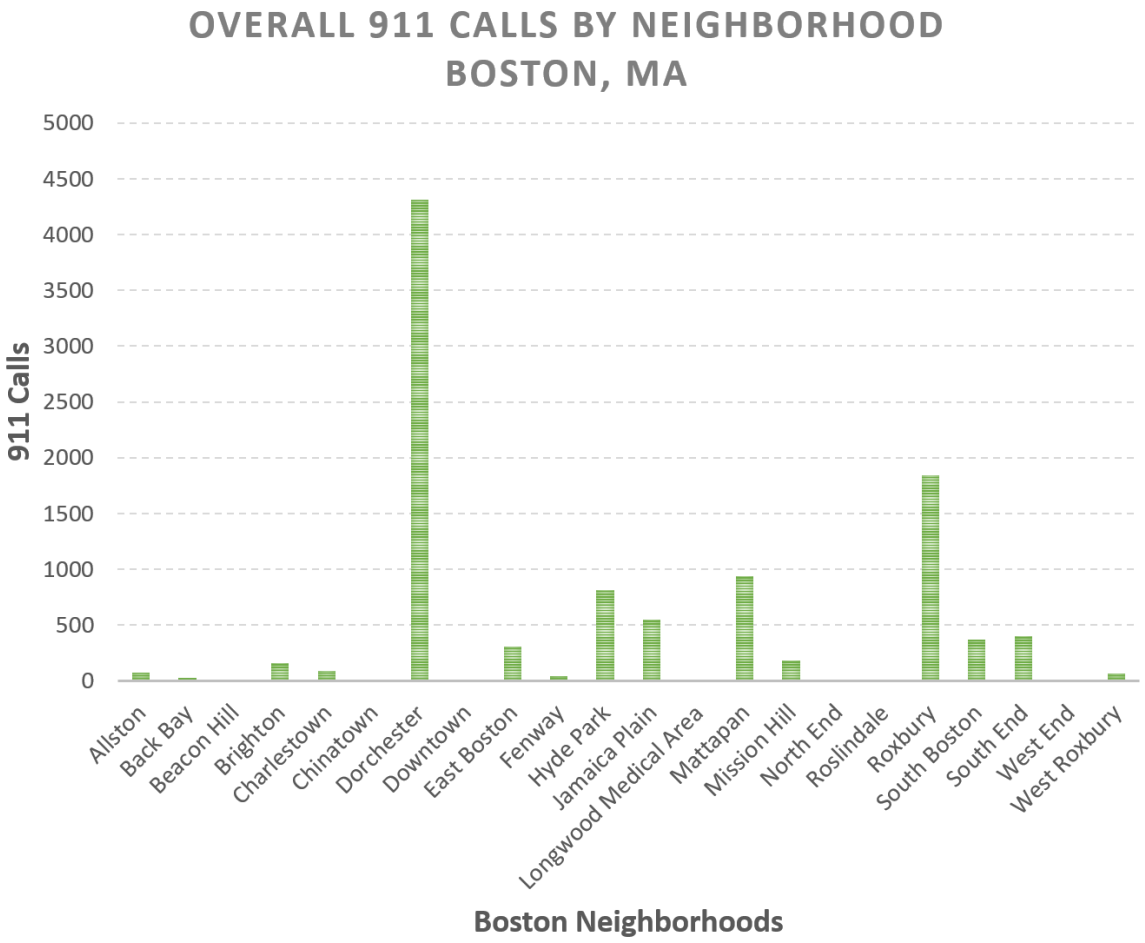
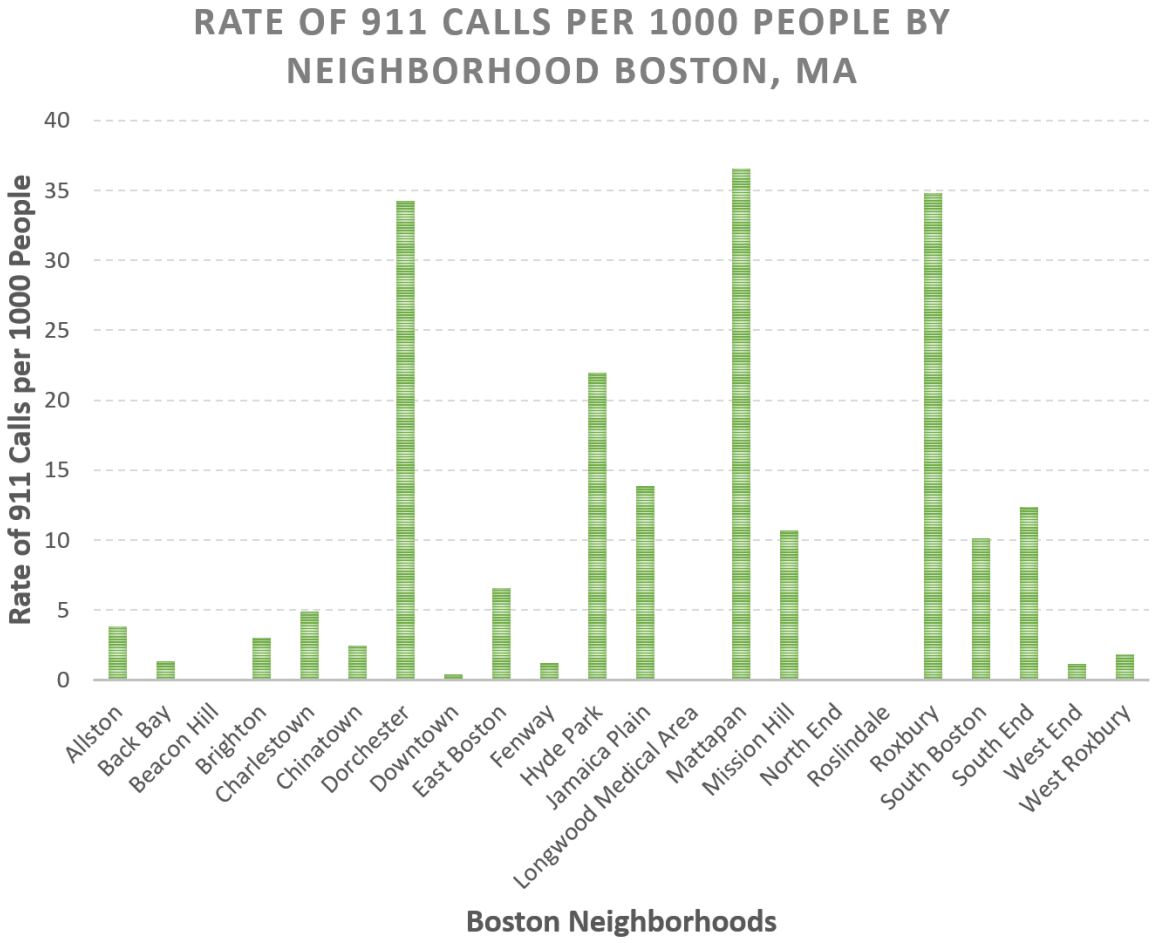
Subjective Responses: 911 Calls





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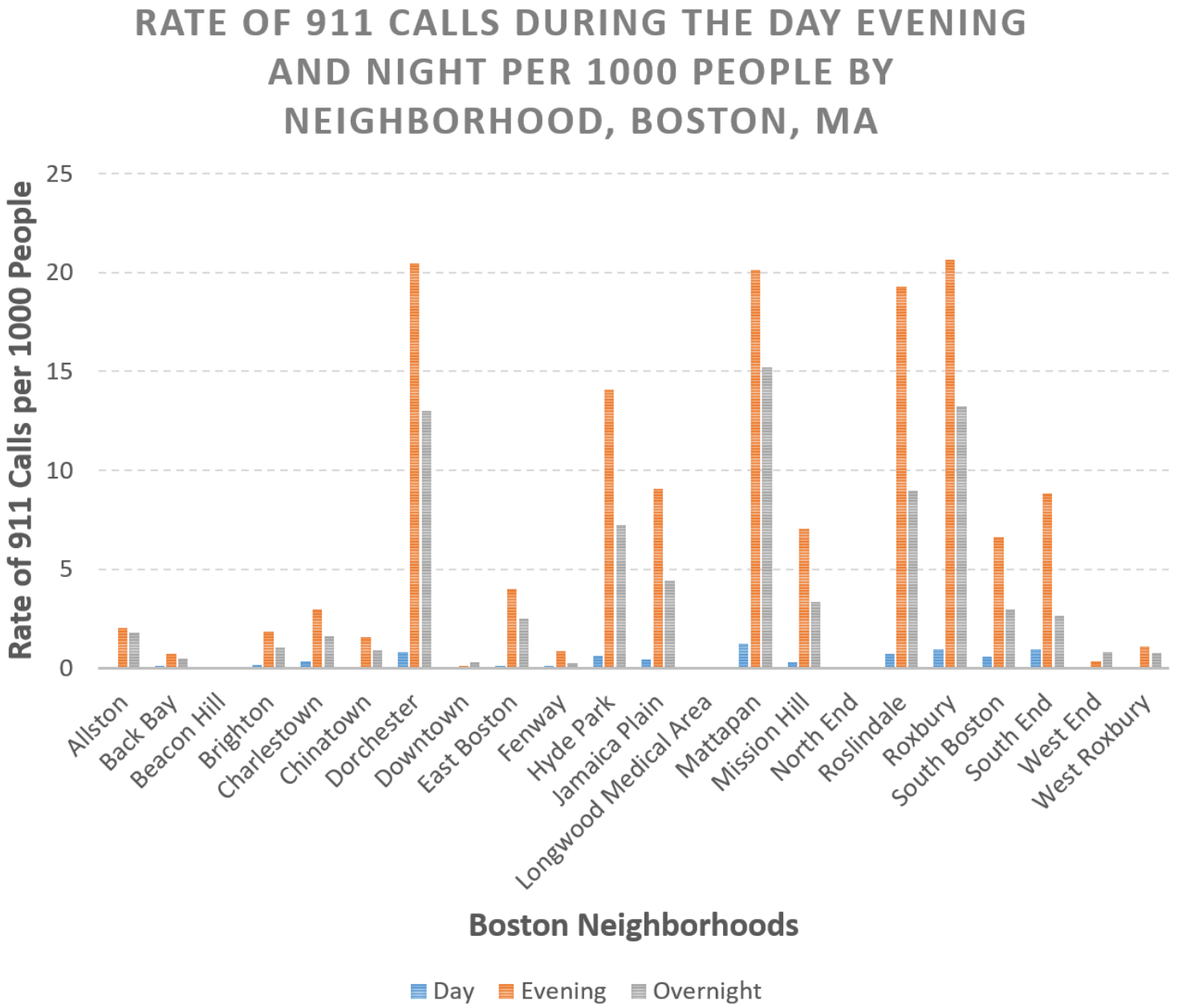
Subjective Responses: 911 Calls



Key Findings

1. The majority of 911 calls were in the evening and overnight

2. Dorchester, Mattapan, Roxbury, and Roslindale had the highest rates of calls.

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Subjective Responses: 311 Reports

By Hour	Service Requests
Midnight	348
1:00 AM	171
2:00 AM	72
3:00 AM	42
4:00 AM	31
5:00 AM	11
6:00 AM	50
7:00 AM	55
8:00 AM	61
9:00 AM	69
10:00 AM	67
11:00 AM	55
Noon	35
1:00 PM	35
2:00 PM	29
3:00 PM	32
4:00 PM	28
5:00 PM	67
6:00 PM	39
7:00 PM	76
8:00 PM	360
9:00 PM	1152
10:00 PM	917
11:00 PM	636
Total	4438

Neighborhood	Service Requests
Dorchester	1381
Roxbury	477
Roslindale	455
South Boston / South Bost	297
Jamaica Plain	264
Greater Mattapan	247
Hyde Park	221
Boston	160
Mission Hill	158
South End	142
East Boston	112
Charlestown	103
South Boston	102
Allston / Brighton	79
Downtown / Financial Distr	76
West Roxbury	57
[NULL]	31
Back Bay	21
Fenway / Kenmore / Audut	15
Brighton	13
Mattapan	12
Allston	10
Beacon Hill	5
Total	4438

By Day	Service Requests
Sunday	883
Monday	535
Tuesday	489
Wednesday	445
Thursday	431
Friday	654
Saturday	1001
Total	4438

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We are interested in understanding who in Boston **is most vulnerable** to firework sounds

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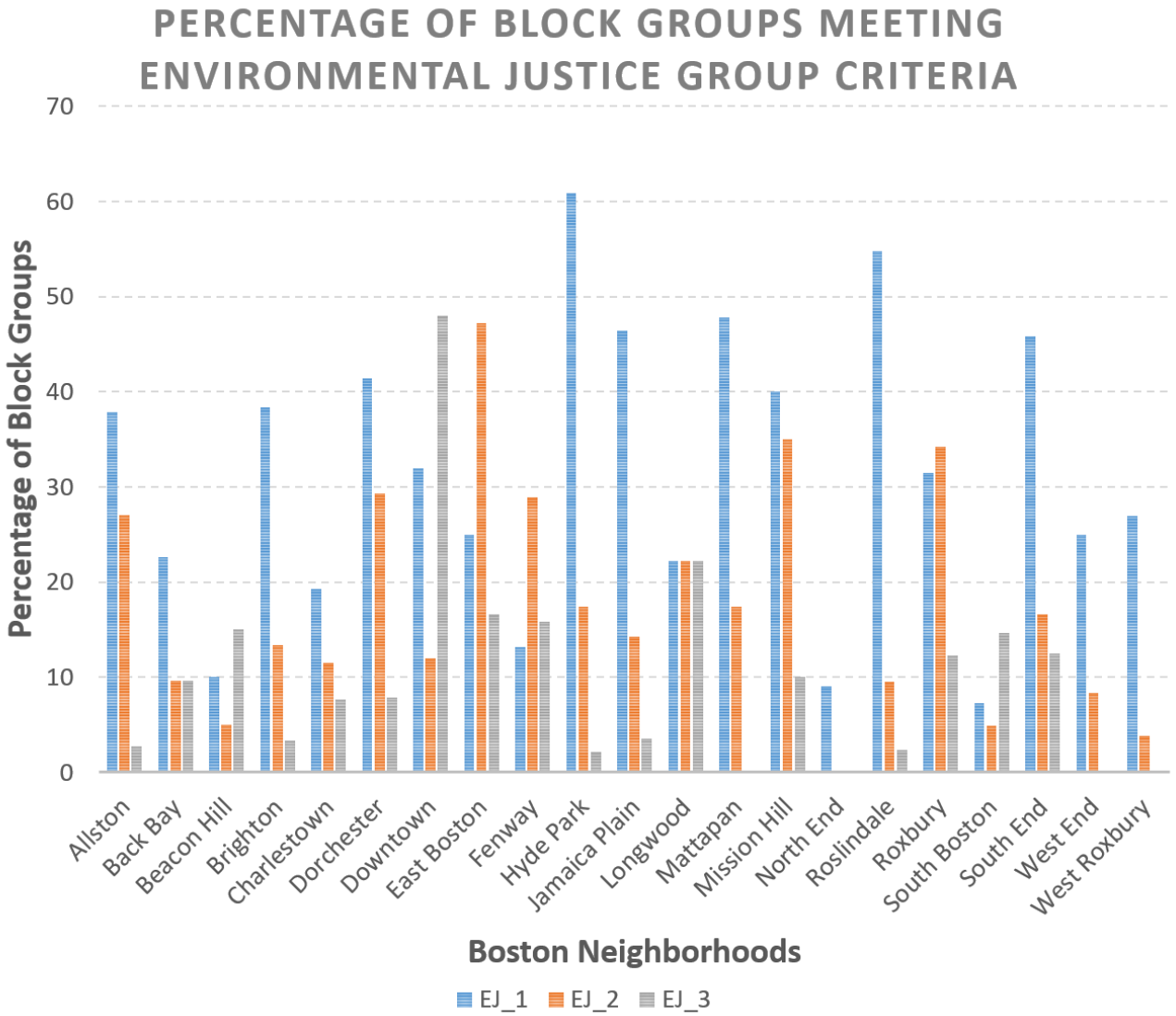
Vulnerability: All Together

Notable Keywords Mentioned	Service Requests
bombs	156
Marty	127
dog	93
firecrackers	87
explosion	81
pet	70
war zone	53
task force	46
vote	45
PTSD	30
elderly/ senior	29
vet	18



EJ_# = # of EJ Criteria (English Isolation, Income, or % Minority

Firework Noise Risk Index

Community Noise Lab created a **Firework Noise Risk Index**, which is an index between **0 and 1**. Values closest **to 1 = HIGH RISK**

Our index is based on the following criteria:

- Percentage people living under the poverty line (census block)
- Percentage minority (census block)
- Percentage older than 65 (census block)
- Percentage children (younger than 18) (census block)
- Percentage speaking English less than well (census block)
- Percentage with disability status (census tract)
- Percentage older than 65 and living alone (census block)
- Reported shootings (census block)

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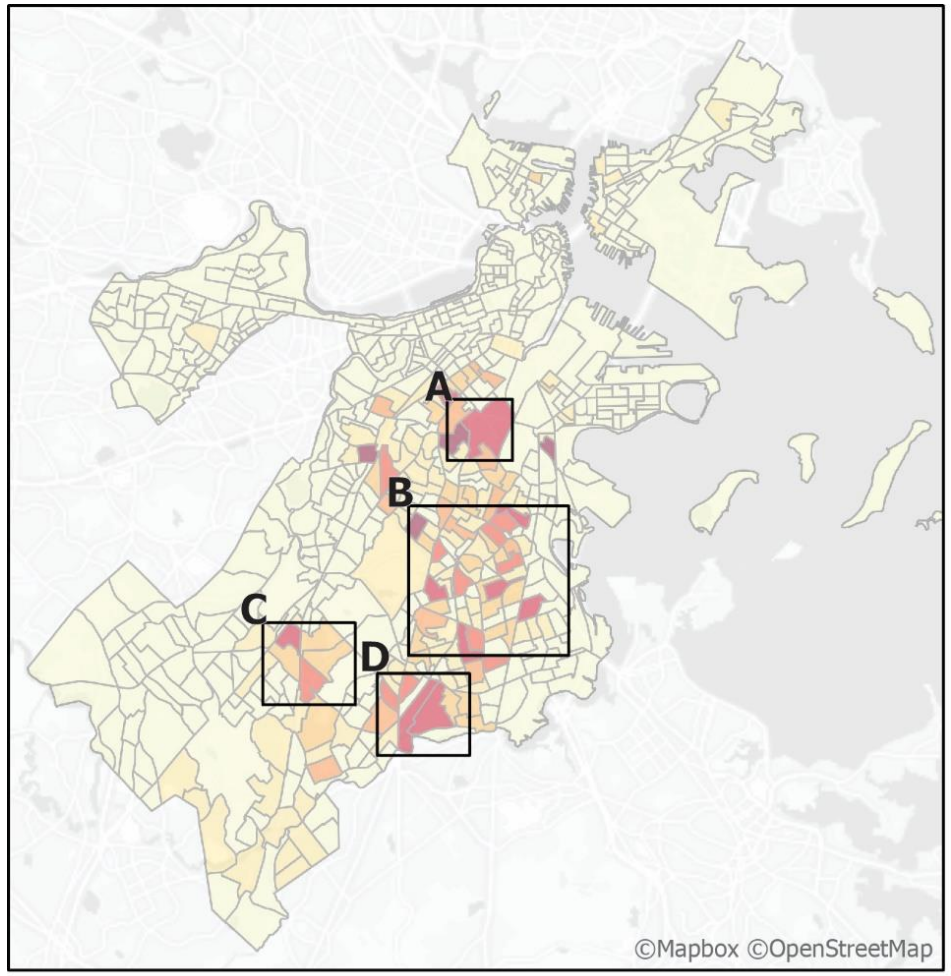
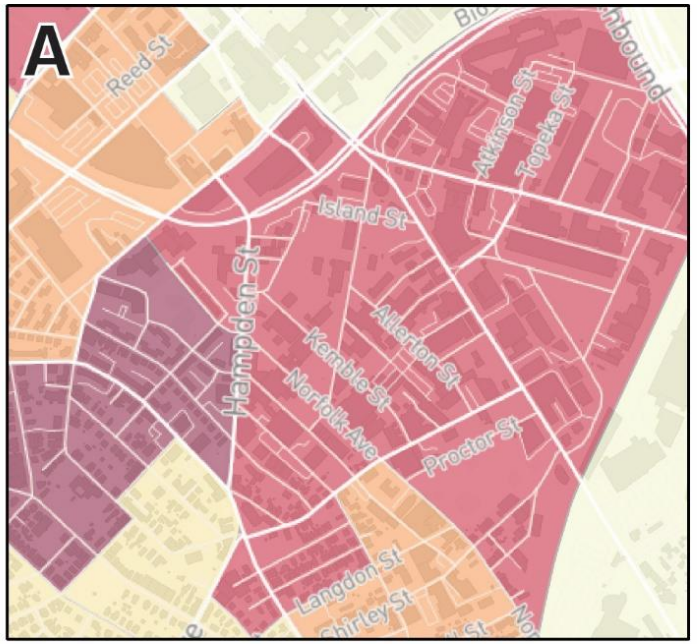
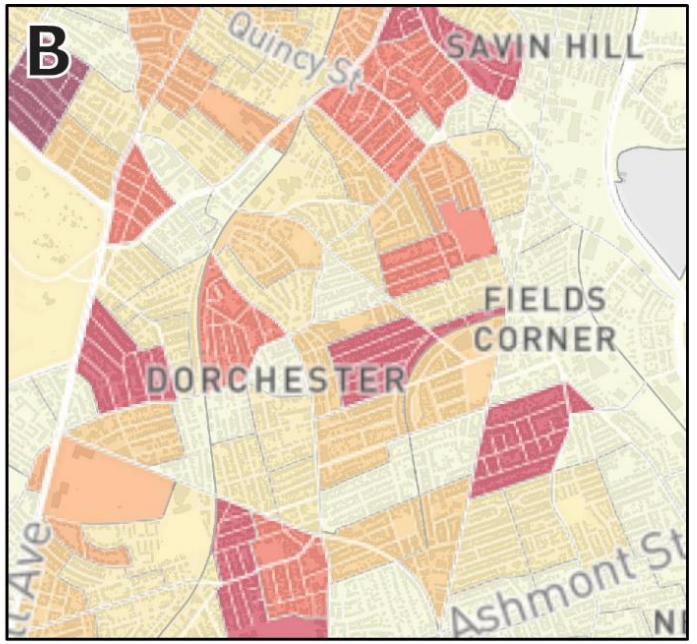
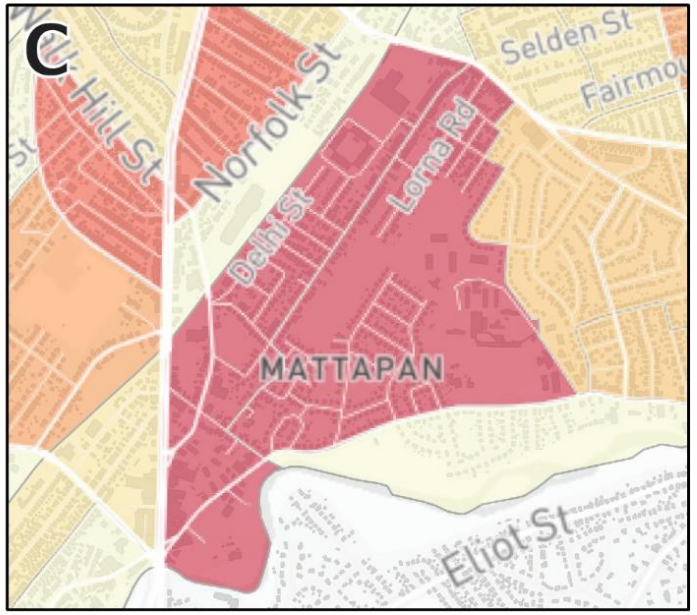
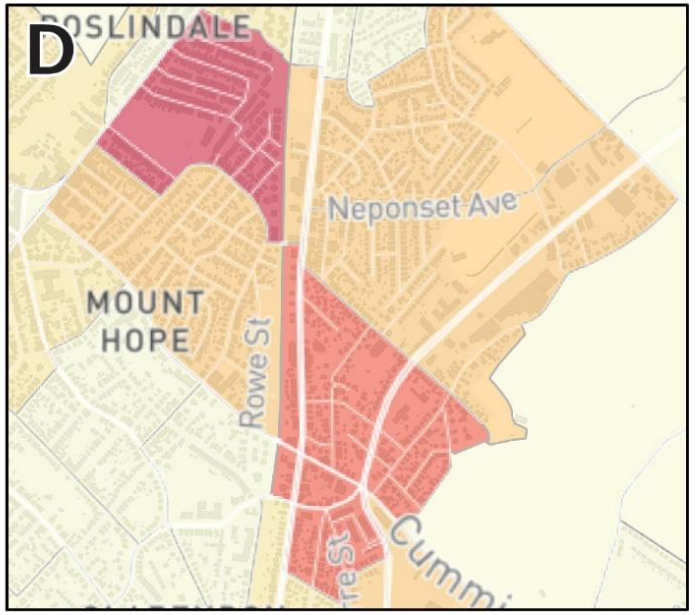
Firework Noise Risk











Firework noise risk index

≤0.1	≤0.3	≤0.5	≤1.0
≤0.2	≤0.4	≤0.75	

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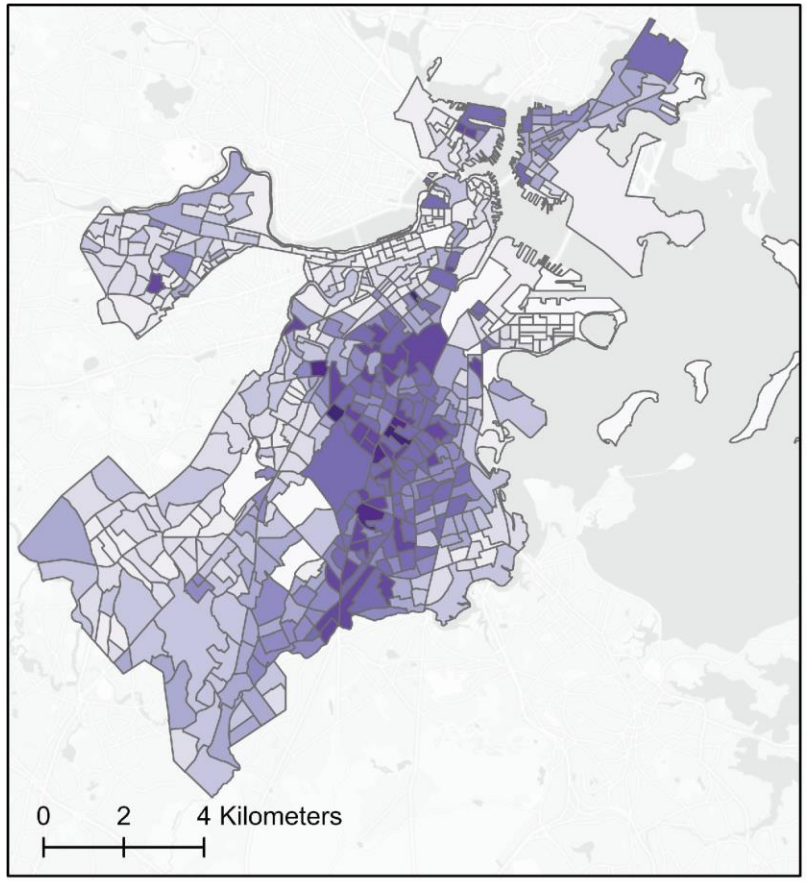
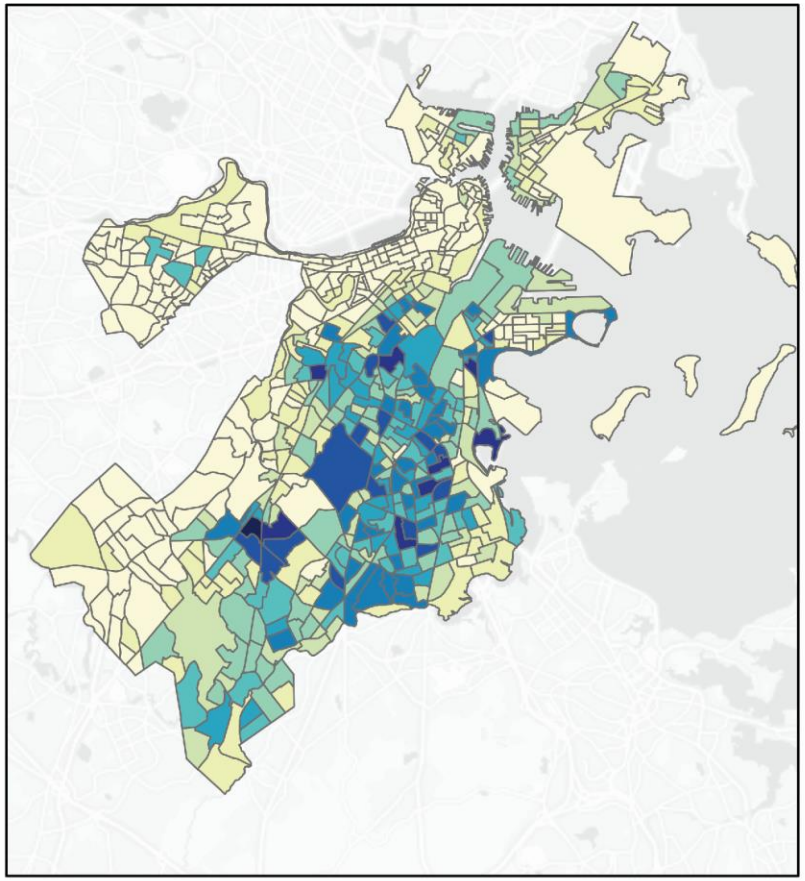
Overall



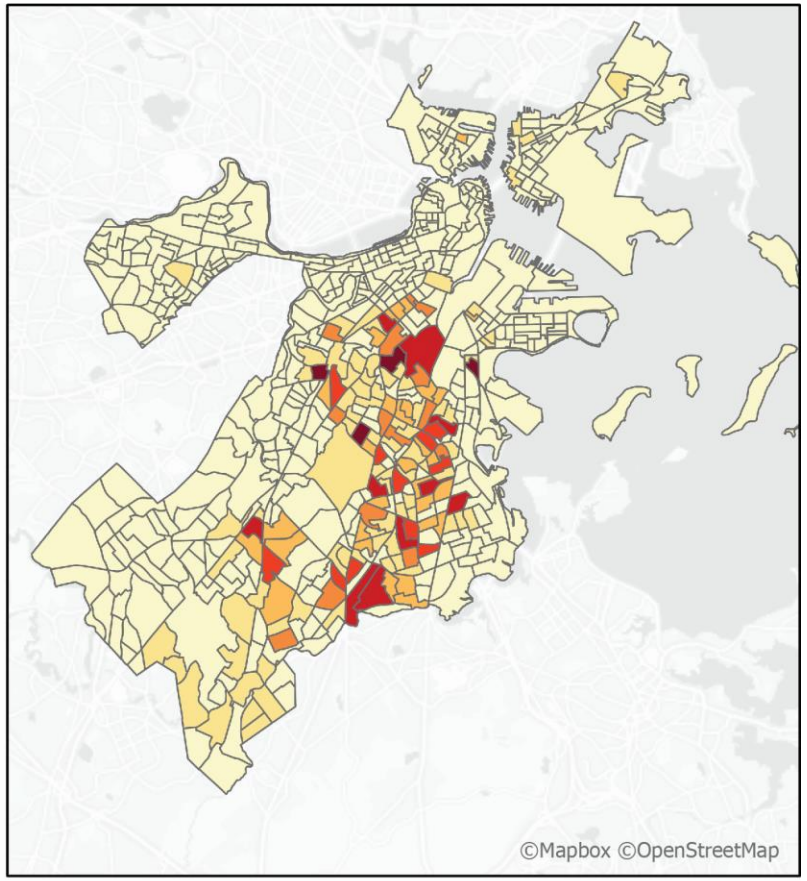
Firework noise vulnerability index

≤0.1 ≤0.2 ≤0.3 ≤0.4 ≤0.5 ≤0.6 ≤0.7 ≤0.8 ≤0.9 ≤1.0



Firework complaint calls

≤5 ≤13 ≤22 ≤33 ≤45 ≤59 ≤74 ≤94 ≤140 ≤220



Firework noise risk index

≤0.1 ≤0.2 ≤0.3 ≤0.4 ≤0.5 ≤0.75 ≤1.0

Risk Score

Next Steps

1. You tell us. Community Noise Lab works for **YOU**.

2. A copy of this presentation will be made freely available.

3. You are free to use any graphics, tables, and charts.

4. Help us publish our work
    1. Academic Publication (Marisa!)
    2. Community Report
    3. Op-Ed in Local Press

5. Adopt the NoiseScore App as a City-wide tool. Community Noise Lab can help the City of Boston examine a wide range of noise issues.

6. Use our data—it is free, will always be free. **Work with us!!**

To learn more about Community Noise Lab:

communitynoiselab.org

@noiseandthecity

Our Team

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Special Thanks

City of Boston Fireworks Task Force
Jerome Smith
Office of City Councilor Julia Mejia
New Urban Mechanics, City of Boston